201-39502

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William C. Norvell Jr.
Signature

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	ROGER ROBERTSON, ET AL	§	
		§	
FILING DATE:	HEREWITH	§	ATTORNEY DOCKET NO.
		§	2718/97-307
		§	
TITLE:	PHOSPHOROUS FLUORESCENT LIGHT ASSEMBLY EXCITED BY LIGHT EMITTING DIODES	§	

TRANSMITTAL

COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

Sir:

Enclosed herewith regarding the above identified application is.

XX Submission of Application under 37 C.F.R. 1.53;

XX Verified Statement (Declaration) Claiming Small Entity Status (37 CFR 1.9(f) and 1.27(c) - Small Business Concern; and

XX Check in the amount of $665.00 as the filing fee for this application.

The Commissioner is hereby authorized to charge any underpayment of fees or credit any overpayment of fees associated with this communication to Beirne, Maynard & Parsons, L.L.P., deposit account number **02-2265**. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

William C. Norvell Jr.

WILLIAM C. NORVELL, JR.
Registration No. 26,212
Beirne, Maynard & Parsons, L.L.P.
1300 Post Oak Boulevard, Ste. 2500
Houston, TX 77056-3000
Telephone: (713) 960-7362
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William C. Norvell

Signature

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APPLICANT:	ROGER ROBERTSON, ET AL	§	
		§	
FILING DATE:	HEREWITH	§	ATTORNEY DOCKET NO.
		§	2718/97-307
		§	
TITLE:	PHOSPHOROUS FLUORESCENT LIGHT	§	
	ASSEMBLY EXCITED BY LIGHT	§	
	EMITTING DIODES	§	

SUBMISSION OF APPLICATION UNDER 37 C.F.R. 1.53

COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

Sir:

Attached is an application for Letters Patent Under 37 CFR 1.53 as follows:

Applicant/Inventor:	ROGER ROBERTSON
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Mailing Address:	4569 W. H/W 86 Joplin, MO 64804
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Citizenship:	UNITED STATES
Mailing Address:	10345 County Rd. 130 Carthage, MO 64836

Applicant/Inventor: PAUL ECKELS

Citizenship: UNITED STATES

Mailing Address: 811 Rustic Ridge
Joplin, MO 64804

Applicant/Inventor: PETER WELLER

Citizenship: UNITED STATES

Mailing Address: 3201 Sunset Drive
Joplin, MO 64804

Applicant/Inventor: DANNY LAMBETH

Citizenship: UNITED STATES

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Applicant/Inventor: RANDY PYRTLE

Citizenship: UNITED STATES

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Applicant/Inventor: RANDY BACKLER

Citizenship: UNITED STATES

Mailing Address: 2139 Forest Drive
Carthage, MO 64836

Number of Pages:	Specification -	7	pages
	Claims -	1	pages
	Abstract -	1	page
	Drawings -	1	number of sheets
Filing Fee:	Check No. 6102	$665.00	Small Entity

The Commission is hereby authorized to charge any underpayment of fees or credit any overpayment of fees associated with this communication to Beirne, Maynard & Parsons, L.L.P., deposit account number **02-2265**. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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Facsimile: (713) 960-1527

Date: March 2, 1998

AGG39ABE.WP

Attorney 2718/97-307

TITLE: **PHOSPHOROUS FLUORESCENT LIGHT ASSEMBLY EXCITED BY LIGHT EMITTING DIODES**

ABSTRACT OF THE DISCLOSURE

The present invention incorporates a series of light emitting diodes which transmit an ultra-violet region of the electromagnetic spectrum to a bed of phosphorous to provide a fluorescent light source.

BACKGROUND OF THE INVENTION

(1) FIELD OF THE INVENTION: The invention relates to the field of fluorescent lighting which is excited by light emitting diodes.

(2) DESCRIPTION OF THE PRIOR ART: Early artificial lighting technology has utilized a metal filament, such as tungsten contained within an enclosed glass tube upon which a vacuum is drawn. An electric current is passed across the filament and the metal begins to glow white hot due to the resistance of the tungsten to the flowing electrons in the electric current. This concept results in an extremely low energy conversion rate of electricity utilized to provide visible light because of the large heat losses and relatively short life span of the tungsten filament. Nevertheless, this incandescent light technology has been commercially successful for quite some time.

In the late 1930's, fluorescent light technology resulted in considerable energy savings over that required in incandescent systems. The typical fluorescent lamp is an electrical discharge device which utilizes a low-pressure mercury vapor arc to generate an ultra-violet energy source. This energy is absorbed by a coating of phosphorous on the inside of a glass tube and the phosphor converts the ultra-violet energy to a visible wavelength of a particular color. The process by which phosphor absorbs the ultra-violet radiation and de-excites by admitting visible radiation is commonly referred to as fluorescence. The wavelengths of the generated light are determined by the composition of the phosphor, and such composition and phosphor determination and calculation to obtain the desired wavelength and, in turn, the achieved light color, are well known to those skilled in the art and is not part of this invention,

per se. For example, the phosphor may be a fluoride of lanthanum, gadolinium or yttrium activated by erbium or thulium and sensitized by either ytterbium. These phosphors have an excitation spectrum extending from approximately 9000 to 10,400A. Oxy sulfides of lanthanum gadolinium or yttrium and activated by erbium or thulium and thereafter sensitized by ytterbium also may be utilized. The phosphor may be coated onto the transparent, preferably glass, enclosure portion of the lighting assembly in a number of ways. It may be suspended in a suitable binder and painted onto the surface or phosphor crystals may be grown on such surface for ultimate contact with the light emitting diode crystals and the crystals may be ground and polished on one face and cemented together with transparent cement, or the like.

There are many advantages and disadvantages to mercury-based fluorescent lighting. First, the advantages include better lumen efficacy than incandescent lighting and an expected average life span in excess of 10 to 20 times. Thus, fluorescent technology decreases the number of lamps utilized for a given time period and the labor associated with replacing the incandescent bulb. Conversely, the disadvantages of fluorescent lighting include less than ideal energy conversion to light (only about 23% of the total lamp wattage in a standard fluorescent lamp is actually transformed into visible light), the need for heavy and costly electrical componentry to start and regulate the arc within the lamp, and the presence of mercury and rare earth gases (usually argon, krypton, neon, or a mixture of these) at lamp disposal which are potentially environmentally damaging.

Applicant is aware of the following prior art patents which generally relate to the subject matter of the present invention:

U.S. Patent No.	Patentee
3,529,200	Potter et al
3,591,941	Jaffe
3,593,055	Geusic et al
3,659,136	Grodkiewicz
3,774,086	Vincent
4,035,686	Fleming
4,385,343	Plumly
4,473,834	Soclof
4,847,508	Kokubu
5,020,252	De Boef
5,251,392	McManigal
5,276,591	Hagerty
5,365,411	Rycroft
5,452,190	Priesemuth
5,640,792	Smith et al
5,653,523	Roberts

The present invention is directed to overcoming the problems associated with the prior art, as described above.

SUMMARY OF THE INVENTION

The present invention provides a lighting assembly having a housing. A source of electric power is transmitted exteriorally to within the housing. A series of light emitting diodes are mounted within the housing and sufficient in output wavelength for excitation of phosphorous receptive to an ultra-violet region of the electromagnetic spectrum. Electric power transforming means are provided to convert the electric power into a known voltage for use by the light emitting diodes. A light emitting transparent surface having an interior surface area is provided and which may form a part of the housing. A coating of ultra-violet excitable phosphorous material is placed on the glass and interior of the housing whereby when the phosphorous coating is excited by light emitted from the diodes, a light spectrum visible to the naked eye is produced through the transparent surface.

BRIEF DESCRIPTION OF THE DRAWING

The single drawing, Fig. 1, is a schematic, horizontal cross-sectional view of the lighting assembly of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now, with reference to Fig. 1, there is shown the lighting assembly 100 of the present invention. The assembly 100 consists of an outer housing 101 having parallel vertically extending side wall members 101a and 101c intersecting a flat vertical upper surface or wall 101b which, in turn, has an opening 104 therethrough for receipt of conventional electric lines 103a and 103b extending to a source of electric power (not shown). The electric lines 103a, 103b extend to a transformer 106 for transforming the electric current into known and readily calculable voltage for use with the light emitting diodes of the present invention.

The housing 101 also has a lowerly facing horizontal second end 101d terminating at each end by the respective vertical housing side members 101a, 101c. A light emitting face 101d oriented in one or more directions to direct a beam or beams of light visible to the naked eye typically would be transparent or, alternatively, may be tinted or colored, and is made of glass, plastic or other smooth surface having an inwardly facing smooth surface 101d-1 upon which the phosphor is placed to provide the coating 102. "Transparent" as used herein contemplates a range of faces from fully transparent to shaded, tinted or colored, it being understood that the amount of transparency is selective, depending upon the quantum of light spectrum required to be delivered through and by the assembly.

Immediate the interior of the housing 101 between the upper end 101b and the glass 101d-1 is a subhousing member 105 securely extending between the parallel side members 101a, 101c. The subhousing 105 secures a series of aligned individual ultra-violet emitting light emitting diodes clusterly mounted thereon and identified in Fig. 1 as 106a, 106b, 106c, 106d, 106e, 106f, 106g, 106h, 106i, 106j, 106k, 106l, and 106m. One or more subhousings 105 may be provided with accompanying LEDs as the case and the necessity dictate.

The LEDs preferably incorporable within the present invention are made by the Nichia America Corporation and emit radiation into the ultra-violet region of the electro-magnetic spectrum. The preferred InGaN diode will have a peak intensity wavelength of about 371nm and about an 8.6nm full width half maximum dispersion with an output within 6nm of one of the secondary ultra-violet output peeks of a mercury arc found in current or traditional fluorescent lighting. It is believed that the life span of this type of diode is in excess of about 100,000 hours and will provide satisfactory luminescence upon the phosphorous coating of the glass or other smooth surface.

The type of phosphorous selected for use in the present invention and the coating and the means used to coat the transparent surface are well within the skill of artisans in the field of fluorescent lighting.

It is well known that ultra-violet radio frequency radiation may be harmful to humans, and it will be appreciated that conventional radiation protection should be provided by means of adequate housing components. Furthermore, it will be appreciated that the present invention provides a light source the intensity of which may easily be accomplished by provision of a rheostat circuit, as opposed to complicated ballasting and controls which are frequently required

for prior art fluorescent lighting systems. Moreover, since light emitting diodes are highly efficient, low voltage devices, solar and other energy sources are easily adapted for incorporation as the electrical energy source for use with the present invention, as well as direct current battery backup systems.

Although the invention has been described in terms of specified embodiments which are set forth in detail, it should be understood that this is by illustration only and that the invention is not necessarily limited thereto, since alternative embodiments and operating techniques will become apparent to those skilled in the art in view of the disclosure. Accordingly modifications are contemplated which can be made without departing from the spirit of the described invention.

What is claimed and desired to be secured by Letters Patent is:

(1) A lighting assembly comprising:

(1) a housing;

(2) a source of electric power transmitted within the housing;

(3) a series of light emitting diodes mounted within said housing and sufficient in output wavelength for excitation of phosphorous receptive to an ultra-violet region of the electromagnetic spectrum;

(4) transforming means to convert power into a known voltage for use by a plurality of said light emitting diodes;

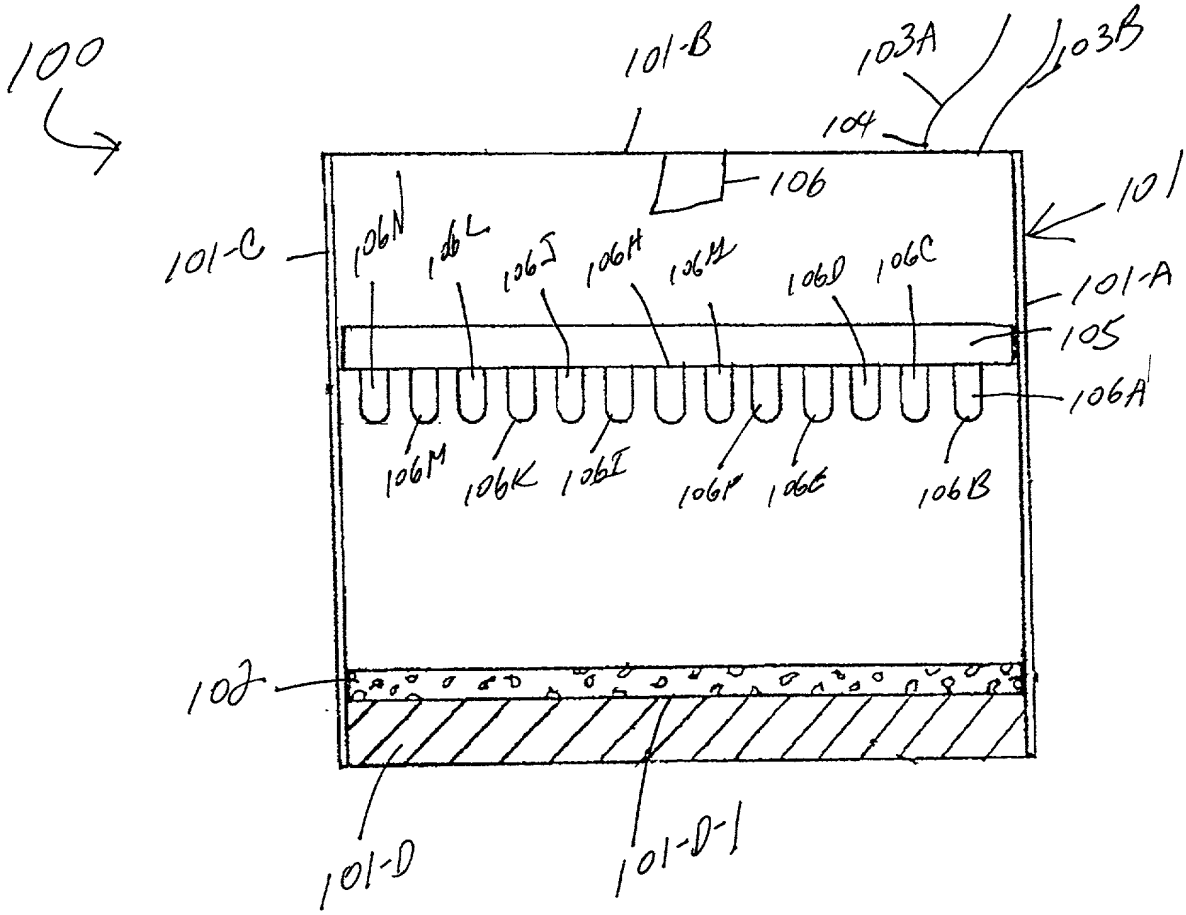
(5) a light emitting transparent surface having an interior surface area; and

(6) a coating of ultra-violet excitable phosphorous and placed on the interior surface area of said transparent enclosure, whereby when said phosphorous coating is excited by light emitted from said diodes, a light spectrum visible to the naked eye is produced by said coating and through the transparent surface.

(2) The assembly of Claim 1 wherein each diode has a peak intensity wavelength of 371nm and a full width at 1/2 maximum dispersion of about 8.6.

(3) The assembly of Claim 1 wherein each diode output is no less than about 6nm of a secondary ultra-violet output peak of a fluorescent mercury arch.

Fig. 1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101-D
101-D-1

Docket No. 2718/97-307

Applicants: Roger Robertson, et al
Serial No:
Filed: March 2, 1998
For: Phosphorous Fluorescent Light Assembly Excited by Light Emitting Diodes

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) AND 1.27(c) - SMALL BUSINESS CONCERN

I hereby declare that I am an official of the small business concern empowered to act on behalf of the concern identified below:

NAME: Mark Williams
ADDRESS: P. O. Box 837
Carthage, Missouri 64836

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly, or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled Phosphorous Fluorescent Light Assembly Excited By Light Emitting Diodes by inventors Roger Robertson, et al described in the specification identified above.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below and no rights to the invention are held by any person, other than the inventor, who could not qualify as a small business concern under 37 CFR 1.9(d) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e):

NAME:
ADDRESS:

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Name of Person Signing: Mark Williams
Title of Person Other Than Owner: C.E.O.
Address of Person Signing: P. O. Box 837
Carthage, Missouri 64836

Date: 3/2/98 Signature: [signature]

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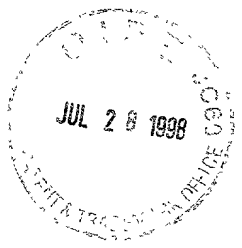
#3



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Signature

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	ROGER ROBERTSON, ET AL	§	
		§	
FILING DATE:	03/02/98	§	ATTORNEY DOCKET NO.
		§	2718/97-307
SERIAL NO.:	09/033,430	§	
		§	
TITLE:	PHOSPHOROUS FLUORESCENT LIGHT ASSEMBLY EXCITED BY LIGHT EMITTING DIODES	§	GROUP ART UNIT: 2875

OATH AND POWER OF ATTORNEY

THE STATE OF MISSOURI §
§
COUNTY OF JASPER §

BEFORE ME, the undersigned authority, on this date, set forth below, personally appeared before me, Roger Robertson, Mark Williams, Paul Eckels, Peter Weller, Danny Lambeth, Randy Pyrtle, and Randy Backler, known to me to be the persons whose signatures are set forth below, and after being first duly sworn by me, did state under oath, the following:

Our resident, post office address and citizenship is as stated below next to each of our names.

We believe we are the original, first and sole inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled "PHOSPHOROUS FLUORESCENT LIGHT ASSEMBLY EXCITED BY LIGHT EMITTING DIODES," the specification of which was filed on March 2, 1998.

We hereby swear or affirm that we have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

We acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1,56(a).

1.56 DUTY OF DISCLOSURE-INFORMATION MATERIAL TO PATENTABILITY

A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

(1) prior art cited in search reports of a foreign patent office in a counterpart application; and

(2) the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentability defines, to make sure that any material information contained therein is disclosed to the Office.

We hereby swear or affirm that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY

As named inventors, we hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith, **WILLIAM C. NORVELL, JR.**, Registration No. 26,212, of the firm of BEIRNE, MAYNARD & PARSONS, L.L.P., **Ernest Roy Purser, Sr.**, Registered Patent Agent, P. O. Box 15633, Arlington, Virginia 22215. WE REQUEST THAT ALL CORRESPONDENCE BE ADDRESSED TO:

William C. Norvell, Jr.
BEIRNE, MAYNARD & PARSONS, L.L.P.
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Wells Fargo Tower, 25th Floor
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Tel: (713) 960-7362
Fax: (713) 960-1527

Full Name of Inventor: ROGER ROBERTSON

Inventors' Signature: _____

Date: 7/23/98

Residence/Post Office Address: 4569 W. H/W 86
Joplin, MO 64804

Citizenship: UNITED STATES OF AMERICA

SWORN TO AND SUBSCRIBED BEFORE ME, a notary public in and for the State of Missouri, County of Jasper, on this the 23 day of July, 1998.

_____
NOTARY PUBLIC IN AND FOR
THE STATE OF MISSOURI

My Commission Expires: Judith Ann Shores, Notary Public
State of Missouri, Jasper County
My Commission Expires June 17, 2000

Full Name of Inventor: MARK WILLIAMS

Inventors' Signature:

Date: 7/23/98

Residence/Post Office Address: 10345 County Rd. 130
Carthage, MO 64836

Citizenship: UNITED STATES OF AMERICA

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NOTARY PUBLIC IN AND FOR
THE STATE OF MISSOURI

My Commission Expires: Judith Ann Shores, Notary Public
State of Missouri, Jasper County
My Commission Expires June 17, 2000

Full Name of Inventor: PAUL ECKELS

Inventors' Signature:

Date: 7-23-98

Residence/Post Office Address: 811 Rustic Ridge
Joplin, MO 64804

Citizenship: UNITED STATES OF AMERICA

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State of Missouri, Jasper County
My Commission Expires June 17, 2000

Full Name of Inventor: **PETER WELLER**

Inventors' Signature: Peter K. Weller

Date: 7-23-98

Residence/Post Office Address: 3201 Sunset Drive
Joplin, MO 64804

Citizenship: UNITED STATES OF AMERICA

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Judith Ann Shores
NOTARY PUBLIC IN AND FOR
THE STATE OF MISSOURI

My Commission Expires: Judith Ann Shores, Notary Public
State of Missouri, Jasper County
My Commission Expires June 17, 2000

Full Name of Inventor: **DANNY LAMBETH**

Inventors' Signature: Danny Lambeth

Date: 7.23.98

Residence/Post Office Address: 2426 W. Sequoia Lane
Carthage, MO 64836

Citizenship: UNITED STATES OF AMERICA

SWORN TO AND SUBSCRIBED BEFORE ME, a notary public in and for the State of Missouri, County of Jasper, on this the 23 day of July, 1998.

Judith Ann Shores
NOTARY PUBLIC IN AND FOR
THE STATE OF MISSOURI

My Commission Expires: Judith Ann Shores, Notary Public
State of Missouri, Jasper County
My Commission Expires June 17, 2000

Full Name of Inventor: **RANDY PYRTLE**

Inventors' Signature: Randy Pyrtle

Date: 7-23-98

Residence/Post Office Address: 3320 Texas Avenue 204A
Joplin, MO 64804

Citizenship: UNITED STATES OF AMERICA

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Judith Ann Shores
NOTARY PUBLIC IN AND FOR
THE STATE OF MISSOURI

My Commission Expires: Judith Ann Shores, Notary Public
State of Missouri, Jasper County
My Commission Expires June 17, 2000

Full Name of Inventor: **RANDY BACKLER**

Inventors' Signature: Randy Backler

Date: 7/23/98

Residence/Post Office Address: 2139 Forest Drive
Carthage, MO 64836

Citizenship: UNITED STATES OF AMERICA

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